

PREFACE

During August/September 2004, a group of 52 physicists from 29 laboratories in 14 countries met in Erice to participate in the 42nd Course of the International School of Subnuclear Physics. The countries represented by the participants were: Belarus, France, Germany, Italy, Mexico, Poland, Russia, Slovenia, Sweden, Turkey, The Netherlands, Ukraine, United Kingdom and the United States of America.

The School was sponsored by the Academies of Sciences of Estonia, Georgia, Lithuania, Russia and Ukraine; the Chinese Academy of Sciences; the Commission of the European Communities; the European Physical Society; the Italian Ministry of Education, University and Scientific Research; the Sicilian Regional Government; the Weizmann Institute of Science; the World Federation of Scientists and the World Laboratory.

The purpose of the School was to focus attention on the phenomenological and theoretical developments in Gauge Theories, as well as in global and local Supersymmetry, and in all the other sectors of Subnuclear Physics. Experimental highlights from the most relevant sources of new data were presented and discussed, as reported in the contents.

An original feature of the School, introduced in 1996, is a series of special sessions devoted to “New Talents”. This is a serious problem in Experimental Physics where collaborations count several hundreds of participants and it is almost impossible for young fellows to be known. Even if with much less emphasis the problem exists also in Theoretical Physics. So we decided to offer the young fellows a possibility to let them be known. Twenty-six “new talents” were invited to present a paper, followed by a discussion. Four were given awards: one for an original theoretical work; one for an original experimental work; one for the best overview of a theoretical subject; and one for the best overview of an experimental subject. These special sessions devoted to New Talents represent the projection of Subnuclear Physics on the axis of the young generation.

As every year, the discussion sessions have been the focal point of the School’s activity.

During the organization and the running of this year’s Course, I enjoyed the collaboration of my colleague and friend, Gerardus ’t Hooft, who shared with me the Directorship of the Course. I would like to thank him, together with the group of invited scientists and all the people who contributed to the success of this year’s Course.

I hope the reader will enjoy the book as much as the students attending the lectures and discussion sessions. Thanks to the work of the Scientific Secretaries, the discussions have been reproduced as faithfully as possible. At various stages of my work I have enjoyed the collaboration of many friends whose contributions have been extremely important for the School and are highly appreciated. I thank them most warmly. A final acknowledgement to all those in Erice, Bologna and Geneva, who have helped me on so many occasions and to whom I feel very indebted.

Antonino Zichichi
Geneva, October 2004